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Original Operating Instructions · English

Operating Instructions L-BV3

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A Gardner Denver Product

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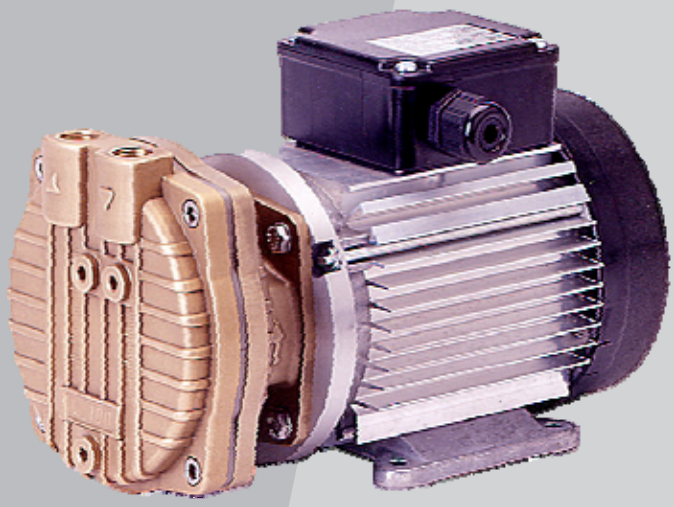

2BV3151

L-Serie
L-Series
Flüssig-
keitsring
Liquid Ring

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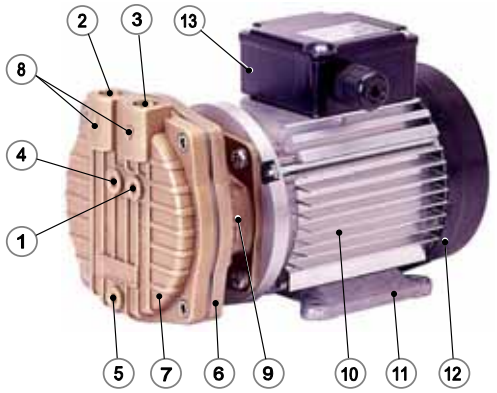

Fig. 1: Design of liquid-ring vacuum pump/compressor

1 Operating-liquid port
2 Discharge connection
3 Inlet connection
4 Connection for cavitation protection
5 Drain hole
6 Vacuum pump/compressor housing
7 Vacuum pump/compressor cover
8 Flow direction arrows
9 Rotating direction arrow
10 Drive motor
11 Base
12 Fan guard (over external fan)
13 Terminal box

1 Safety

1.1 Definitions

To point out dangers and important information, the following signal words and symbols are used in these operating instructions:

1.1.1 Safety alert symbol

The **safety alert symbol** ⚠ is located in the safety precautions in the highlighted heading field on the left next to the signal word (DANGER, WARNING, CAUTION).
Safety precautions **with** a safety alert symbol indicate a danger of **injuries**.
Be sure to follow these safety precautions to protect against **injuries or death**!
Safety precautions **without** a safety alert symbol indicate a danger of **damage**.

1.1.2 Signal words

DANGER
WARNING
CAUTION
NOTICE
NOTE

The **signal words** are located in the safety precautions in the highlighted heading field.
They follow a certain hierarchy and indicate
(in conjunction with the safety alert symbol, see Chapter 1.1.1) the **seriousness of the danger** and the **type of warning**.
See the following explanations:

⚠ DANGER

Danger of injuries.
Indicates an imminently hazardous situation, that **will** result in **death or serious injury** if the corresponding measures are not taken.

⚠ WARNING

Danger of injuries.
Indicates a potentially hazardous situation, that **could** result in **death or serious injury** if the corresponding measures are not taken.

⚠ CAUTION

Danger of injuries.
Indicates a potentially hazardous situation, that may result in **minor or moderate injury** if the corresponding measures are not taken.

CAUTION

Danger of damage.
Indicates a potentially hazardous situation that may result in **property damage** if the corresponding measures are not taken.

NOTICE

Indicates a possible **disadvantage**, i.e. undesirable conditions or consequences can occur if the corresponding measures are not taken.

NOTE

Indicates a possible **advantage** if the corresponding measures are taken; tip.

1.2 General safety precautions

⚠ WARNING

Improper use of the unit can result in serious or even fatal injuries!

These operating instructions

- must have been read completely and understood before beginning any work with or at the pump-motor unit,
- must be strictly observed,
- must be available at the operating location of the pump-motor unit.

⚠ WARNING

Improper use of the unit can result in serious or even fatal injuries!

Only operate the pump-motor unit

- for the purposes indicated under "Intended Use"!
- with the fluids indicated under 'Intended Use'!
- with the values indicated under 'Technical Data'!

⚠ WARNING

Improper use of the unit can result in serious or even fatal injuries!

All work on and with the pump-motor unit (transport, installation, operation, shut-down, maintenance, disposal) may only be carried out by **trained, reliable expert personnel**!

⚠ WARNING

When working on the unit, there is a danger of injury, e.g. in the form of cuts/cutting off, crushing and burns!

During all work on and with the pump-motor unit (transport, installation, operation, shut-down, maintenance, disposal) wear **personal safety equipment (safety helmet, protective gloves, safety shoes)**!

⚠ WARNING

Hair and clothing can be pulled into the unit or caught and wound up moving parts!

Do not wear long, loose hair or wide, loose clothes! Use a hair net!

⚠ DANGER

Electrical danger!

Before beginning work on the unit or system, the following measures must be carried out:

- Deenergize.
- Secure against being switched on again.
- Determine whether deenergized.
- Ground and short-circuit.
- Cover or block off adjacent energized parts.

⚠ DANGER

Electrical danger!

Work on electrical installations may be carried out by trained and authorized electricians only!

⚠ DANGER

Electrical danger!

Replace loose connections, singed or burned cables immediately!

⚠ DANGER

Electrical danger!

Do not open the motor terminal box unless absence of electricity has been ensured!

⚠ DANGER

Electrical danger!

Depending on the charging state of the capacitors, a residual voltage may be present on the terminals in the terminal box.

After opening the terminal box cover, it must be ensured that the capacitors are completely deenergized:

- Measure the voltage at the corresponding jumpers (see the circuit diagram in the terminal box).
- Dissipate the residual voltage with suitable means if necessary.

The capacitors must be completely deenergized.

⚠ WARNING

Danger due to gauge pressure and vacuum!
Danger due to escaping fluid!

Before beginning work on the unit or system:

- Interrupt supply of operating liquid.
- Bleed lines and vacuum pump/compressor (depressurize).

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⚠ WARNING

Danger from rotating external fan of unit!
Only operate the unit with the fan guard mounted!
It is prohibited to remove the fan guard!

⚠ WARNING

Danger from rotating impeller of unit!
Only operate the unit with the vacuum pump/compressor cover and housing mounted!
It is prohibited to remove the vacuum pump/compressor cover and the housing!

⚠ WARNING

Danger due to gauge pressure and vacuum!
Danger due to escaping fluid!
Danger from rotating impeller of unit!
Only operate the unit with the pipes/hoses connected to the intake and discharge connection, as well as to the operating-liquid port!

⚠ WARNING

Danger in the form of cuts or cutting off extremities on the impeller of the pump-motor unit!
Do not reach into the unit through open connections!
Do not insert objects into the unit through the openings!

⚠ WARNING

Danger due to gauge pressure and vacuum!
Check the lines and containers used for sufficient strength!

⚠ WARNING

Danger due to gauge pressure and vacuum!
Danger due to escaping fluid!
Check the connections of the pipe/hose connections for leaks!

⚠ WARNING

Danger of burns and scalding from hot surfaces of the pump-motor unit and from hot fluids!
Do not touch during operation!
Allow to cool after shut-down!

⚠ CAUTION

Danger of crushing from unit tipping over!
Secure the pump-motor unit on the installation surface before putting into operation!

1.3 Residual risks

⚠ WARNING

Danger zone:
Fan guard
Hazard:
Long, loose hair can be drawn into external fan through fan guard grate, even with fan guard mounted!
Protective measures:
Wear hair net!

⚠ WARNING

Danger zone:
Hot surface.
Hazard:
Burns/scalding possible.
Protective measures:
Do not touch! Wear protective gloves!

2 Intended Use

These operating instructions

- applies to liquid-ring vacuum pumps/compressors of the series L-BV3, model 2BV3151,
- contain instructions bearing on transport and handling, installation, commissioning, operation, shut-down, storage, servicing and disposal of the L-BV3,
- must be completely read and understood by all operating and servicing personnel before beginning to work with or on the L-BV3,
- must be strictly observed,
- must be available at the site of operation of the L-BV3.

About the operating and servicing personnel of the L-BV3:

- These persons must be trained and authorized for the work to be carried out.
- Work on electrical installations may be carried out by trained and authorized electricians only.

The L-BV3

- are pump-motor units for generating vacuum or gauge pressure.
- are used to extract, transport and compress the following pumped gases/vapors:
  - all dry and humid gases, which are not explosive, aggressive or toxic,
  - preferably air or air/vapor mixtures.
  - The gases/vapors to be fed must be free of solid material. However, small quantities of light suspended materials or liquids can also be transported.
- are designed for operation with the following **operating liquids**:
  - Water with a pH of 6.5 to 9.5, free of solid materials (such as sand).
  - If the pH values or operating liquids differ, it is necessary to contact the Service Department.
- have the **rough vacuum range** as the intended operating range.
- are intended for industrial applications.
- are designed for continuous operation.

When operating the L-BV3, the limits listed in Chapter 3, "Technical Data", Pg. 7 ff. must always be complied with.
If the L-BV3 is used to extract hot fluids, the necessary safety measures must be taken by the user.

Foreseeable Misuse

It is prohibited

- to use the L-BV3 in applications other than industrial applications unless the necessary protection is provided on the system, e.g. guards suitable for children's fingers,
- to use the L-BV3 in rooms in which explosive gases can occur,
- the sucking up, feeding and compression of explosive, flammable, aggressive or toxic fluids,
- to operate the L-BV3 with values other than those specified in Chapter 3, "Technical Data", Pg. 7 ff.

Any unauthorized modifications of the L-BV3 are prohibited for safety reasons.
Maintenance and repair work by the operator are only permitted in the scope described in these operating instructions.
Any maintenance and repair work going beyond this may only be conducted by companies authorized by the manufacturer (inquiry with the Service Department necessary).

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3 Technical Data

3.1 Mechanical data

Weight

Type	Weight	
	approx. [kg]	approx. [lbs]
2BV3151	9	19.8
Higher weights are possible with special models.		

Minimum distances for heat dissipation

Type	Minimum distance from fan guard to adjacent surface	
	[mm]	[inches]
2BV3151	20	0.787

Noise level

Measuring-surface sound-pressure level according to EN ISO 3744 measured at a distance of 1 m [3.28 ft] with moderate throttling (8 kPa abs. [1.16 psia]) and lines connected.

Type	1-m measuring-surface sound pressure level L [dB (A)]	
	at 50 Hz:	at 60 Hz:
2BV3151	70	70

Operating speed

See rating plate.

NOTICE

Exceeding of the operating speed will negatively affect the operating behavior of the pump-motor unit:

- higher noise emissions
- stronger vibrations
- shorter grease consumption time
- reduced bearing change interval

To prevent damage due to excessively high speeds, it may be necessary to request the **limit speed** (inquire with the Service Department).

Tightening torques

The values specified here for tightening torques apply unless other values are indicated.

Tightening torques for screw connections (pipe-connections)		
Thread	[Nm] ± 10 %	[ft lbs] ± 10 %
G⅛	4.5	3.32
G⅜	16	11.8

Tightening torques for electrical connections (terminal board-connections)		
Thread	[Nm] ± 10 %	[ft lbs] ± 10 %
M4	1.0	0.738
M5	2.2	1.62

These values for electrical connections applies to all terminal board connections with the exception of modular terminal blocks.)

Tightening torques for electrical connections (modular terminal blocks)		
Thread	[Nm] ± 10 %	[ft lbs] ± 10 %
M3	0.6	0.443

(These values for electrical connections apply to all modular terminal blocks.)

3.2 Electrical data

See drive motor rating plate.

3.3 Operating conditions

Temperatures

Temperature of pumped gases/vapors:	
max. +110 °C	max. +230 °F

At higher fluid temperatures, measures must be taken on the system to prevent burns, e.g. mount separating safety device (cover).

In addition, we also recommend one of the following measures at temperatures > 80 °C [> 176 °F]:

- Increasing the operating-liquid flow rate by up to twice the rated liquid flow rate (cooling circuit)
- Use of a series capacitor

Operating-liquid temperature:	
max. +40 °C	max. +104 °F
min. +5 °C	min. +41 °F
Nominal value:	
+15 °C	+59 °F

Ambient temperature:	
max. +40 °C	+104 °F
min. +5 °C	+41 °F

Pressures

Min. inlet pressure $p_{1\ min}$:
Depending on the type and temperature of the operating liquid.
During vacuum operation without cavitation protection (cavitation protection hole closed): 5 kPa 0.725 psi It may not be dropped below to prevent damage due to cavitation! Damage due to cavitation are purposely disregarded if the minimum inlet pressure is 3.3 kPa [0.479 psi]. The specified values apply to the following conditions: • Operating liquid: Water at +15 °C [+59 °F] • pumped gases/vapors: dry air at +20 °C [68 °F] They are higher the higher the temperature and the higher the vapor pressure of the operating liquid used.
During vacuum operation with cavitation protection (cavitation protection hole open): max. achievable vacuum, i.e. complete throttling
The following generally applies: The higher the temperature, the lower the intake capacity, i.e. the higher the minimum achievable inlet pressure.

Max. discharge pressure $p_{2\ max}$ during vacuum operation:	
110 kPa abs.	16.0 psia
This value applies, provided the rated operating-liquid flow rate is adhered to.	

Max. discharge pressure (differential pressure) $p_{2\ max}$ during compressor operation (at inlet pressure p_1 = 101.3 bar abs. [14.7 psia]):	
60 kPa	8.70 psi
This value applies, provided the rated operating-liquid flow rate is adhered to.	

Max. permissible pressure in the pump-motor unit $p_{int\ max}$ during compressor operation:	
300 kPa abs.	43.5 psia
If higher pressures can occur in the system, then corresponding protective devices must be provided.	

Max. pre-pressure of the operating liquid	
300 kPa abs.	43.5 psia
When the permissible operating liquid pressure is exceeded, too much liquid enters the vacuum pump/compressor. Damage can occur.	

Liquid quantities

Nominal operating-liquid flow rate		
(with dry air extraction and with water at 15 °C [59 °F] as operating liquid)		
0.65 l/min	0.172 gal (US)/min	0.143 gal (UK)/min
(0.039 m³/h)	(1.38 ft³/h)	

Max. filling quantity for operating liquid at a standstill		
0.200 l	0.053 gal (US)	0.044 gal (UK)
Repeated switching on of the pump-motor unit in the flooded state can result in damage.		

Maximum permissible quantity of water entrained via the inlet connection		
3.9 l/min	1.03 gal (US)/min	0.858 gal (UK)/min
If larger quantities can occur, a separator must be installed upstream on the inlet side.		

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4 Operating modes

The pump-motor unit can function in several different operating modes.
These differ in how the pump-motor unit is supplied with operating liquid:

- Self-priming operation
- Operation with operating-liquid feed:
  - Non-automatic operation
  - Automatic operation

NOTICE

The following is dependent on the operating mode:

- when and how the pump-motor unit must be filled with operating liquid the first time,
- how the pump-motor unit is put into operation.

The specifications for this are contained in Chapter 6, "Installation", Pg. 11ff., and Chapter 7, "Commissioning", Pg. 16ff.

4.1 Self-priming operation

In this operating mode the pump-motor unit automatically sucks in the operating liquid.
The operating-liquid flow rate is automatically adjusted.

See Fig. 4, Pg. 17.

4.2 Operation with operating-liquid feed

In this operating mode the pump-motor unit DOES NOT automatically suck in the operating liquid.
A certain volume flow ("nominal operating-liquid flow rate") or pre-pressure must be set for the operating liquid.

Here the following additional distinctions are made:

Non-automatic operation

In this case the operating liquid feed is switched on and off manually with a stop valve.

See Fig. 6, Pg. 19.

Automatic operation

In this case the operating liquid feed is switched on and off by a solenoid valve. The solenoid valve is dependent on the motor operating mode:

- Motor/pump-motor unit switched on: Valve open.
- Motor/pump-motor unit switched off: Valve closed.

See Fig. 7, Pg. 19.

5 Transport and Handling

⚠ WARNING

Improper use of the machine can result in serious or even fatal injuries!

Have you read the safety precautions in Chapter 1, "Safety", Pg. 3 f.?
Otherwise you may not carry out any work with or on the machine!

⚠ WARNING

Danger from tipping or falling loads!

Prior to transport and handling make sure that all components are securely assembled and secure or remove all components the fasteners of which have been loosened!

⚠ CAUTION

Tipping or falling can lead to crushing, broken bones etc.!

Sharp edges can cause cuts!

Wear personal safety equipment (protective helmet, protective gloves, safety shoes) during transport!

Packing:

In case of a separate delivery, the pump-motor unit is packed in a carton.
In the case of a group delivery, the pump-motor units are packed in cardboard boxes or screen boxes on pallets.

Manual handling:

⚠ WARNING

Danger from lifting heavy loads!

Manual handling of the unit is only permitted within the following limits:

- max. 30 kg [max. 66 lbs] for men
- max. 10 kg [max. 22 lbs] for women
- max. 5 kg [max. 11 lbs] for pregnant women

For the weight of the pump-motor unit, see Chapter 3.1, "Mechanical data", Section "Weight", Pg. 7.

For weights above the given values use suitable lifting appliances and handling equipment!

⚠ WARNING

Danger from tipping or falling loads!

Do not hold the pump-motor unit on the capacitors or cable glands on the terminal box!

Handling by means of lifting equipment:

⚠ WARNING

Danger from tipping or falling loads!

When transporting with lifting equipment, observe the following basic rules:

- The lifting capacity of lifting equipment and lifting gear must be at least equal to the unit's weight.

  For the weight of the pump-motor unit, see Chapter 3.1, "Mechanical data", Section "Weight", Pg. 7.
- The pump-motor unit must be secured so that it cannot tip or fall.
- Do not hook the pump-motor unit onto the capacitors or cable glands on the terminal box!
- Do not stand or walk under suspended loads!

Use two lifting belts, of which one is routed under the interface between the motor housing and the vacuum pumps/compressor housing, and the other under the interface between the motor housing and the fan guard.

When transporting the pump-motor unit, make sure that attached fittings are not damaged.

⚠ WARNING

Danger from tipping loads!

Be sure to observe the routing of the strap belts under the pump-motor unit, even if the motor is provided with attachment points such as transport eyes or eye bolts.

These are solely designed for the separate transport of the motor, however not for the different weight distribution that results for the mounted vacuum pump/mounted compressor, so that the unit could tip!

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6 Installation

⚠ WARNING

Improper use of the machine can result in serious or even fatal injuries!

Have you read the safety precautions in Chapter 1, "Safety", Pg. 3 f.?
Otherwise you may not carry out any work with or on the machine!

6.1 Installation

⚠ CAUTION

Danger of crushing from pump-motor unit tipping over!

In the unmounted state, the unit can easily tip due to its weight distribution!

Wear gloves and safety shoes! Handle the unit with the appropriate care!

⚠ CAUTION

Danger of tripping and falling!

Make sure the unit does not present a danger of tripping!

⚠ WARNING

Electrical danger!

The pump-motor unit must be installed so that the electrical device cannot be damaged by external influences!

In particular, the feed pipes must be securely routed, e.g. in cable ducts or in the floor.

⚠ CAUTION

Danger of injuries from flying parts!

Select installation so that parts that are thrown out through the grate if the external fan breaks cannot hit persons!

CAUTION

Danger of damage to the pump-motor unit due to overheating!

When installing the unit, make sure that heat dissipation and cooling are not obstructed. The minimum distances specified in Chapter 3.1, "Mechanical data", Section "Minimum distances for heat dissipation", Pg. 7 must be complied with.

Discharge air of other units may not be directly sucked in again!

Minimum distances:

To ensure sufficient cooling of the pump-motor unit, it is absolutely necessary that the required minimum distances to the **fan guard** and to the **face of the vacuum pump/compressor cover** be maintained.

For minimum clearances for heat dissipation and cooling, see Chapter 3.1, "Mechanical data", Section "Minimum distances for heat dissipation", Pg. 7.

Installation conditions:

The pump-motor unit must be installed as follows:

- on flat, level surfaces,
- on stationary (fixed) surfaces or structures,
- at a maximum height of 1000 m [3280 ft] above sea level.

For installation under different conditions, the Service Department must be consulted.

Observe the following when installing the pump-motor unit:

- The **load-bearing capacity** of the installation surface must at least be designed for the weight of the pump-motor unit.
- The **vibration behavior at the operating location** must be taken into account.
  The total vibrations of the unit are dependent on the following factors:
  - the characteristic vibrations of the unit,
  - the alignment and installation,
  - the condition (vibration behavior) of the load-bearing surface,
  - the influences by vibrations of other parts and system components (external vibrations).

  The maximum permissible value for vibrations is v_{eff} = 4.5 mm/s [0.177"/s].
  To ensure proper operation and a long

service life of the pump-motor unit, this value may not be exceeded.
Generally, this value can be adhered to without a special foundation or a special base plate.
The points on the unit for measuring the vibration speed are shown in Fig. 2, Pg. 12.

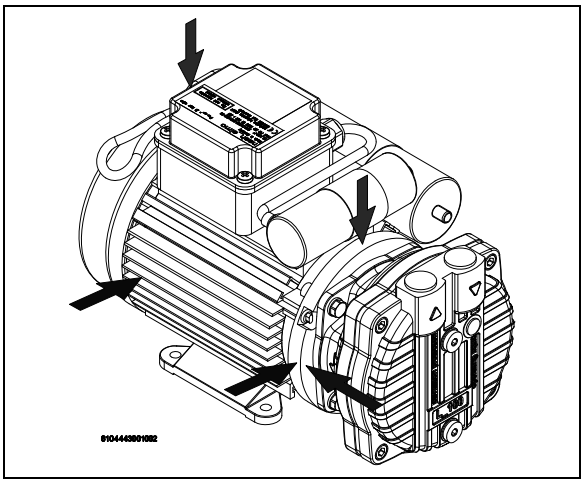

Fig. 2: Points for measuring the vibration speed

Securing:

Screw the feet of the pump-motor unit to the surface with suitable mounting elements.

Proceed as follows:

- The feet of the pump-motor unit are provided with mounting holes.
- Select the suitable screw type.
- Screw the feet of the pump-motor unit to the surface with the screws.
  When doing so, be sure to provide **all** mounting holes with screws!

6.2 Electrical connection (motor)

⚠ DANGER

Electrical danger!
Malpractice can result in severe injuries and material damage!

⚠ DANGER

Electrical danger!
The electrical connection may be carried out by trained and authorized electricians only!

⚠ DANGER

Electrical danger!
Before beginning work on the unit or system, the following measures must be carried out:

- Deenergize.
- Secure against being switched on again.
- Determine whether deenergized.
- Ground and short-circuit.
- Cover or block off adjacent energized parts.

⚠ DANGER

Electrical danger!
Replace loose connections, singed or burned cables immediately!

⚠ DANGER

Electrical danger!
Depending on the charging state of the capacitors, a residual voltage may be present on the terminals in the terminal box.
After opening the terminal box cover, it must be ensured that the capacitors are completely deenergized:

- Measure the voltage at the corresponding jumpers (see the circuit diagram in the terminal box).
- Dissipate the residual voltage with suitable means if necessary.

The capacitors must be completely deenergized.

⚠ WARNING

Danger due to gauge pressure and vacuum!
Danger due to escaping fluid!
Before beginning work on the unit or system:
Interrupt supply of operating liquid.
Bleed lines and vacuum pump/compressor (depressurize).

CAUTION

Incorrect connection of the motor can lead to serious damage to the unit!

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Regulations:

The electrical connection must be carried out as follows:

- according to the applicable national and local laws and regulations,
- according to the applicable system-dependent prescriptions and requirements,
- according to the applicable regulations of the utility company.

Electrical power supply:

Observe the rating plate.
It is imperative that the operating conditions correspond to the data given on the rating plate!

Deviations permissible without reduction in performance:

- ±5 % voltage deviation
- ±2 % frequency deviation

Connection to drive-motor terminal box:

Carry out the connection and the arrangement of the jumpers in accordance with the circuit diagram in the terminal box.

Connect the protective conductor to the terminal with the following symbol:

The electrical connection must be carried out as follows:

- The electrical connection must be permanently safe.
- There may be no protruding wire ends.
- Clearance between bare live parts and between bare live parts and ground: ≥ 5.5 mm [0.217"] (at a nominal voltage of UN ≤ 690 V).
- Tightening torques for terminal plate connections:
  see Chapter 3.1, "Mechanical data", Section "Tightening torques", Pg. 7.
- Use suitable cable lugs.
- For terminals with clamping straps, the conductors must be inserted so that approximately the same clamping height results on both sides of the bar. Individual conductors must therefore be bent into a U-shape or connected with a cable lug.
- All conductors under outer angled grounding brackets must be bent into a "U" shape.

This also applies to:

- the protective conductor,
- the outer ground conductor.

Both conductors can be recognized from their color (green/yellow).

⚠ WARNING

Electrical danger!
Clearance between bare live parts and between bare live parts and ground:
at least **5.5 mm [0.217"]** (at a nominal voltage of V_n ≤ 690V)
Make sure there are no protruding pieces of wire!

⚠ WARNING

Electrical danger!
The terminal box must be free from

- foreign bodies,
- dirt,
- humidity.

Terminal box cover and cable entries must be tightly closed so as to make them dustproof and waterproof.
Check for tightness at regular intervals.

For **motor overload protection**:

- Use motor circuit breakers.
- Set the motor circuit breakers to the nominal current specified on the rating plate.

6.3 Connecting pipes/hoses (vacuum pump/compressor)

To prevent foreign bodies from entering the unit, all connections are sealed off when delivered.
Do not remove the sealing plugs until immediately before connecting the pipes/hoses.

For the arrangement of the pipe/hose connections, see Fig. 3, Pg. 14.

The **pumped gases/vapors** are sucked in via the inlet connection and discharged via the discharge connection (see Chapter 6.3.1, Pg. 15).
For operation the unit must be continuously supplied with **operating liquid**.
This is fed in via the operating-liquid port (see Chapter 6.3.2, Pg. 15) and discharged together with the pumped gases/vapors through the discharge connection.

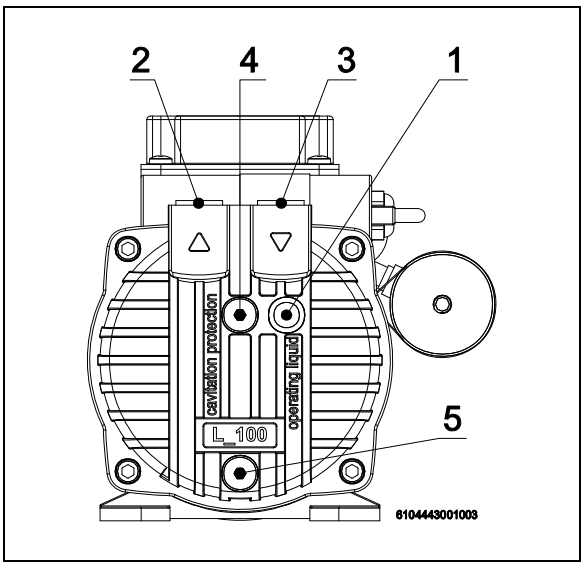

Fig. 3: Pipe/hose connection of vacuum pump/compressor

1 Operating liquid connection
G⅛", 10 mm [0.394"] deep
2 Discharge connection
G⅜", 12 mm [0.472"] deep
3 Inlet connection
G⅜", 12 mm [0.472"] deep
4 Connection for cavitation protection
G⅛", 10 mm [0.394"] deep
5 Drain hole
G⅛", 10 mm [0.394"] deep

CAUTION

If the unit is run dry, the mechanical seal will be destroyed in a matter of seconds!
DO NOT switch on as long as the unit is not filled with operating liquid!

Fill with operating liquid:

When and how the pump-motor unit must be filled with operating liquid the first time is dependent on the operating mode:

- For self-priming operation:
  During installation.
- For operation with operating-liquid feed:
  After completing installation.

For **self-priming operation** you now pour operating liquid into the working space of the pump-motor unit before you connect the pipes/hoses to the unit.
Proceed as follows:

- Pour operating liquid into the open inlet connection or discharge connection. For proper filling quantities, see Chapter 3.3, "Operating conditions", Section "Max. filling quantity for operating liquid at a standstill", Pg. 8.

OR

- Remove the sealing plug with the seal from the cavitation protection hole.
- Pour operating liquid into the open inlet connection or discharge connection until the operating liquid exits from the cavitation protection hole.
- Close the cavitation protection hole with the sealing plug and seal.

Then attach the pipes/hoses to the unit as described in the following.

⚠ WARNING

Danger due to gauge pressure and vacuum!
Danger due to escaping fluid!
During operation, connected pipes and vessels are pressurized or vacuumized!
Make sure that all connections are sufficiently tight! Use only pipes and vessels of sufficient strength!

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NOTICE

Attach pipes/hoses free of mechanical tensions.
Support the weight of the pipes/hoses.

6.3.1 Inlet connection and discharge connection

The **inlet connection** (Fig. 3, Item 3) is marked with an arrow pointing downward (↓). Connect the inlet pipe here. The pumped gases/vapors are sucked in via this.

The **discharge connection** (Fig. 3, Item 2) is marked with an arrow pointing upward (↑). Connect the discharge pipe here. Both the pumped gases/vapors and the operating liquid are discharged via this pipe.

CAUTION

When connecting the pump-motor unit to a vacuum accumulator:
In this case, a check valve must be installed.
Without a check valve, operating liquid can be sucked into the system from the pump-motor unit. Damage to the system can occur!

CAUTION

The tightening torque for pipe connections on intake and discharge connections (G⅜") may not exceed **16 Nm ± 10 % [11.8 ft lbs ± 10 %]**!

6.3.2 Operating-liquid port

The operating liquid connection (Fig. 3, Item 1) is located on the face of the vacuum pump/compressor housing below the inlet connection.
Connect the feed pipe for the operating liquid here.

6.3.3 Notes

NOTICE

For **operating liquid with impurities**:

- Install a filter, screen or separator in the supply line if necessary.

NOTICE

In case of **operating liquid with a high lime content**:

- Soften operating liquid

OR

- Decalcify pump-motor unit regularly (see Chapter 10.1, "Maintenance", Pg. 24).

NOTICE

To prevent installation residues (e.g. welding spatter) from entering the unit,
a start-up screen should be installed in the inlet pipe for the first 100 operating hours.

7 Commissioning

⚠ WARNING

Improper use of the machine can result in serious or even fatal injuries!

Have you read the safety precautions in Chapter 1, "Safety", Pg. 3 f.?
Otherwise you may not carry out any work with or on the machine!

⚠ WARNING

Danger due to gauge pressure and vacuum!

Danger due to escaping fluid!

Danger due to rotating parts!

The pump-motor unit may only be put into operation when the following conditions are met:

- Fan guard and vacuum pump/compressor cover and housing are mounted.
- The lines to the discharge connection, inlet connection and operating-liquid port are attached.
- The lines and connections have been tested for strength and leaks.

CAUTION

If the unit is run dry, the mechanical seal will be destroyed in a matter of seconds!

DO NOT switch on as long as the unit is not filled with operating liquid!

7.1 Preparation and start-up

CAUTION

If the pumped gases/vapors discharged on the pressure side are passed on,
then it must be ensured that the maximum discharge pressure of 110 kPa abs. [16.0 psia] is not exceeded!

NOTICE

Maximum permissible quantity of water entrained via the inlet connection:
See Fig. 9, Pg. 19.

If a shut-off device is installed in the discharge pipe:

Make sure that the unit CANNOT be operated with the shut-off device closed.

Fill with operating liquid:

For **operation with self-priming of the operating liquid** during installation (see Chapter 6.3, "Connecting pipes/hoses (vacuum pump/compressor)", Pg. 14).

For **operation with operating-liquid feed**, you now fill the working area of the unit with operating liquid.
Proceed as follows:

- Remove the sealing plug with the seal from the cavitation protection hole.
- Open the respective shut-off valve until the operating liquid exits from the cavitation protection hole:
  - For non-automatic operation:
    Stop valve (Fig. 6, Pg. 19, Item 4).
  - For automatic operation:
    Stop valve in the bypass pipe (Fig. 7, Pg. 19, Item 4a).
- Close the shut-off valve again.
- Close the cavitation protection hole with the sealing plug and seal.

Then proceed with commissioning as described in the following.

Check connections of the pipes/hoses for leaks.

Check direction of rotation:

- The direction of flow of the pumped gases/vapors is marked with arrows on the intake and discharge connection.
- The intended shaft rotating direction is marked with an arrow on the vacuum pump/compressor housing.
- The pump-motor unit may not be allowed to run dry!
  Have you filled it with operating liquid beforehand (during or after installation)?
  See sections "Fill with operating liquid", Pg. 14 and Pg. 16.
- Briefly switch on pump-motor unit.
- Compare the actual rotating direction of the external fan with the intended shaft rotating direction as it is indicated with the arrow on the vacuum pump/compressor housing of the pump-motor unit (Fig. 1, Pg. 3, Item 9).
- Switch off pump-motor unit again.
- If necessary, reverse the direction of rotation of the motor.

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⚠ DANGER

Electrical danger!

The electrical connection may be carried out by trained and authorized electricians only!

⚠ DANGER

Electrical danger!

Before beginning work on the unit or system, the following measures must be carried out:

- Deenergize.
- Secure against being switched on again.
- Determine whether deenergized.
- Ground and short-circuit.
- Cover or block off adjacent energized parts.

⚠ DANGER

Electrical danger!

Depending on the charging state of the capacitors, a residual voltage may be present on the terminals in the terminal box.

After opening the terminal box cover, it must be ensured that the capacitors are completely deenergized:

- Measure the voltage at the corresponding jumpers (see the circuit diagram in the terminal box).
- Dissipate the residual voltage with suitable means if necessary.

The capacitors must be completely deenergized.

⚠ WARNING

Danger due to gauge pressure and vacuum!

Danger due to escaping fluid!

Before beginning work on the unit or system:

- Interrupt supply of operating liquid.
- Bleed lines and vacuum pump/compressor (depressurize).

The further procedure is again dependent on the unit operating mode:

7.2 Self-priming operation

CAUTION

The liquid level in the feed pipe or in the reservoir may not exceed the height of the shaft center of the pump-motor unit!

If this height is exceeded, too much liquid gets into the pump-motor unit. Damage can occur!

See Fig. 4, Pg. 17.

Here the following must be watched:

- The pump-motor unit must be pre-throttled on the inlet side. This means a vacuum of **at least 80 kPa abs.** [11.6 psia] must be present in the inlet pipe (Item B) at switch-on.
- During switch-on, the liquid level in the feed pipe (Item A) and in the reservoir (Item C) respectively must be at the same level as the center of the unit shaft (Item 1).
- During operation the liquid level in the reservoir (Item C) may not drop below **approx. 1 m [3.28 ft] below** the center of the unit shaft (Item 1).

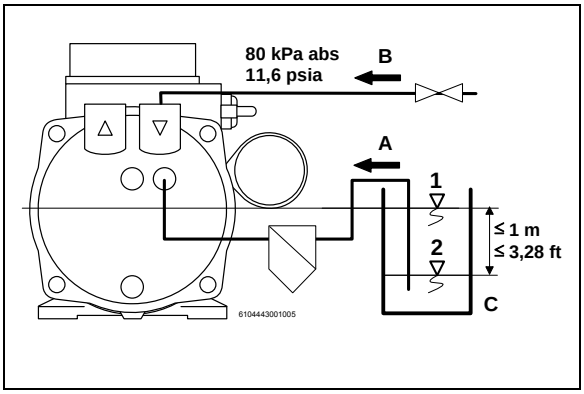

Fig. 4: Self-priming operation

A Feed pipe for operating liquid
B Inlet pipe
C Reservoir for operating liquid

1 Required liquid level when switching on
2 Min. liquid level during operation

Starting the pump-motor unit:

- Switch on the unit.
- The operating liquid is sucked in.

7.3 Operation with operating-liquid feed

See Fig. 5, Pg. 18, and Fig. 8, Pg. 19, as well as Fig. 6, Pg. 19, and Fig. 7, Pg. 19.

Proceed as follows here:

Method A:

1) Set pre-pressure of operating liquid (Fig. 5, Pg. 18):

- Set a pre-pressure p_A in the feed pipe for the operating liquid (Item A) around approx. **100 kPa [14.5 psi] above** the inlet pressure p_B in the inlet pipe (Item B).

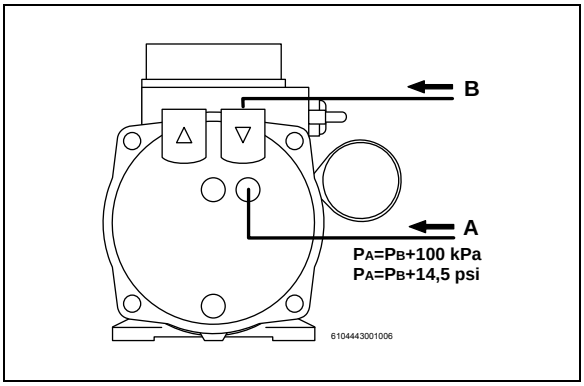

Fig. 5: Setting the operating-liquid flow rate: Setting pre-pressure

A Feed pipe for operating liquid
B Inlet pipe

2) Start up the unit:

For non-automatic operation (Fig. 6, Pg. 19):

- Open the stop valve (Item 4) manually. The operating liquid is fed in.
- Switch on the unit.

For automatic operation (Fig. 7, Pg. 19):

- Switch on the unit.
- The solenoid valve (Item 4) opens and the operating liquid is fed in.

Method B:

1) Start up the unit:

For non-automatic operation (Fig. 6, Pg. 19):

- Open the stop valve (Item 4) manually. The operating liquid is fed in.
- Switch on the unit.

For automatic operation (Fig. 7, Pg. 19):

- Switch on the unit.
- The solenoid valve (Item 4) opens and the operating liquid is fed in.

2) Check the operating-liquid flow rate:

- with the flow meter (Fig. 6, Pg. 19, and Fig. 7, Pg. 19, Item 2)

OR

- by measuring the volume of operating liquid per unit of time that exits at the discharge connection with a graduated vessel (Fig. 8, Pg. 19)

3) Set/correct the operating-liquid flow rate:

- via the control valve (Fig. 6, Pg. 19, and Fig. 7, Pg. 19, Item 3)

Nominal operating-liquid flow rate:
For nominal values, see Chapter 3.3, "Operating conditions", Section "Nominal operating-liquid flow rate", Pg. 8.

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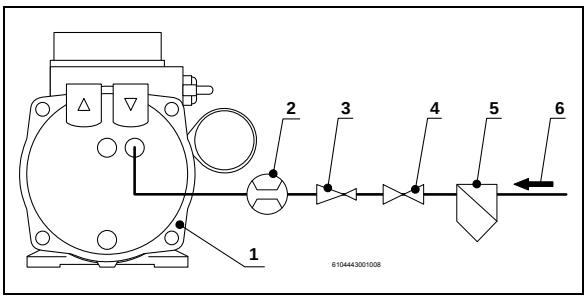

Fig. 6: Operation with operating-liquid feed: Non-automatic operation

1 Pump-motor unit
2 Flow meter
3 Control valve
4 Stop valve
5 Dirt trap
6 Feed pipe for operating liquid

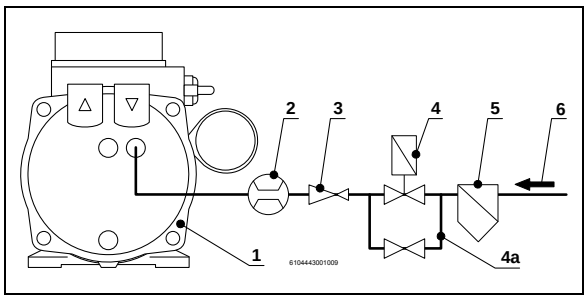

Fig. 7: Operation with operating-liquid feed: Automatic operation

1 Pump-motor unit
2 Flow meter
3 Control valve
4 Solenoid valve, connected to motor
4a Bypass with stop valve (for priming)
5 Dirt trap
6 Feed pipe for operating liquid

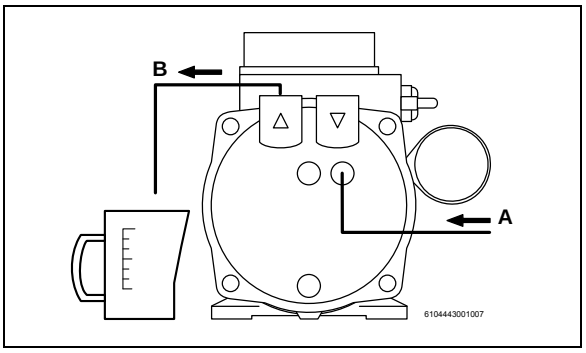

Fig. 8: Setting the operating-liquid flow rate: Measuring the volume with a graduated vessel

A Feed pipe for operating liquid
B Drain pipe for operating liquid

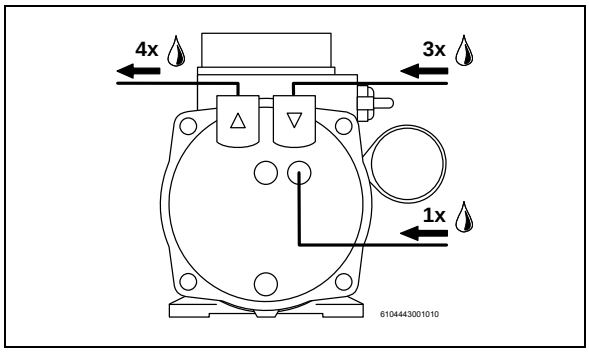

Fig. 9: Maximum permissible quantity of water entrained via the inlet connection

3x quantity of operating-liquid flow rate

8 Operation

⚠ WARNING

Improper use of the machine can result in serious or even fatal injuries!

Have you read the safety precautions in Chapter 1, "Safety", Pg. 3 f.?
Otherwise you may not carry out any work with or on the machine!

⚠ WARNING

Danger due to gauge pressure and vacuum!

Danger due to escaping fluid!

Danger due to rotating parts!

The pump-motor unit may only be put into operation when the following conditions are met:

- Fan guard and vacuum pump/compressor cover and housing are mounted.
- The lines to the discharge connection, inlet connection and operating-liquid port are attached.
- The lines and connections have been tested for strength and leaks.

CAUTION

If the unit is run dry, the mechanical seal will be destroyed in a matter of seconds!

DO NOT switch on as long as the unit is not filled with operating liquid!

⚠ WARNING

Danger of burns and scalding from hot surfaces of the pump-motor unit and from hot fluids!

Do not touch during operation!
Allow to cool after shut-down!

NOTICE

Maximum permissible quantity of water entrained via the inlet connection:
See Fig. 9, Pg. 19.

CAUTION

The feeding in of overheated steam at the inlet connection of the pump-motor unit while it is not rotating has the following effect:

- Operating liquid is pressed out of the pump-motor unit.
- Considerable thermal loading of the pump-motor unit.

The pump-motor unit may be damaged!

Before feeding in overheated steam at the inlet connection, switch on the pump-motor unit for approx. 10 s to ensure sufficient supply with operating liquid. The operating liquid cools the pump-motor unit.

8.1 Self-priming operation

Follow the instructions contained in Chapter 7.2, "Self-priming operation", Pg. 17 for this operating mode.

8.2 Operation with operating-liquid feed

Start-up

For non-automatic operation (Fig. 6, Pg. 19):

- Open the stop valve (Item 4) manually. The operating liquid is fed in.
- Switch on the unit.

For automatic operation (Fig. 7, Pg. 19):

- Switch on the unit.
- The solenoid valve (Item 4) opens and the operating liquid is fed in.

Shut down:

For non-automatic operation (Fig. 6, Pg. 19):

- Switch off the pump-motor unit.
- Close the stop valve (Item 4) manually. Feeding of the operating liquid is cut off.
- The following applies for the control valve (Item 3) for setting the operating-liquid flow rate:
  In case of an interruption in operation, the valve setting (i.e. the valve position or the open valve cross-section) is not changed.

For automatic operation (Fig. 7, Pg. 19):

- Switch off the pump-motor unit.
- The solenoid valve (Item 4) closes, and feeding of the operating liquid is cut off.
- The following applies for the control valve (Item 3) for setting the operating-liquid flow rate:
  In case of an interruption in operation, the valve setting (i.e. the valve position or the open valve cross-section) is not changed.

9 Shut-Down and Longer Standstills

⚠ WARNING

Improper use of the machine can result in serious or even fatal injuries!
Have you read the safety precautions in Chapter 1, "Safety", Pg. 3 f.?
Otherwise you may not carry out any work with or on the machine!

9.1 Draining

⚠ DANGER

Electrical danger!
Before beginning work on the unit or system, the following measures must be carried out:
- Deenergize.
- Secure against being switched on again.
- Determine whether deenergized.
- Ground and short-circuit.
- Cover or block off adjacent energized parts.

⚠ WARNING

Danger due to gauge pressure and vacuum!
Danger due to escaping fluid!
Before beginning work on the unit or system:
- Interrupt supply of operating liquid.
- Bleed lines and vacuum pump/compressor (depressurize).

- Switch off the pump-motor unit.
- The above safety precautions apply when working on the unit or system.
- Provide suitable catch containers below the vacuum pump/compressor cover.
- Open the sealing plug of the drain hole (Fig. 3, Pg. 14, Item 5).
- Allow the liquid to drain out.
- Colse the sealing plug again, tightening torque for G⅛" = 4.5 Nm ± 10 % [3.32 ft lbs ± 10 %].

OR

- Switch off the pump-motor unit.
- The above safety precautions apply when working on the unit or system.
- Have a suitable catch container ready.
- Disconnect the hose connections on the inlet connection, discharge connection and operating liquid opening.
- Remov ethe mounting screws on the feet of the pump-motor unit.
- Place the pump-motor unit on the vacuum pump/compressor cover and tilt it several times over the connection.
- Remount the mounting screws on the feet.
- Reattach the hoses.

9.2 Preparing for longer standstill

Before a longer standstill (from approx. 4 weeks) or when there is danger of frost, proceed as follows:

- Drain pump-motor unit as described in Chapter 9.1, "Draining", Pg. 22.
- Remove the pipe/hose from the intake or discharge connection.
- Pour ¼ l [0.066 gal (US); 0.055 gal (UK)] of preservative (rust protection oil, e.g. Mobilarma 247 form Mobil Oil) into the open intake or discharge connection.
- Close the intake and discharge connection, as well as the operating-liquid port and remount the disconnected pipes/hoses.
- Guide a screwdriver through the central opening in the fan guard up to the shaft end on the external fan side (see Fig. 10, Pg. 23).
- Turn the shaft by hand using the screwdriver.
- Remove the screwdriver again.
- You have two options for the standstill: Either the pump-motor unit remains connected in the system, or the unit is removed for storage.

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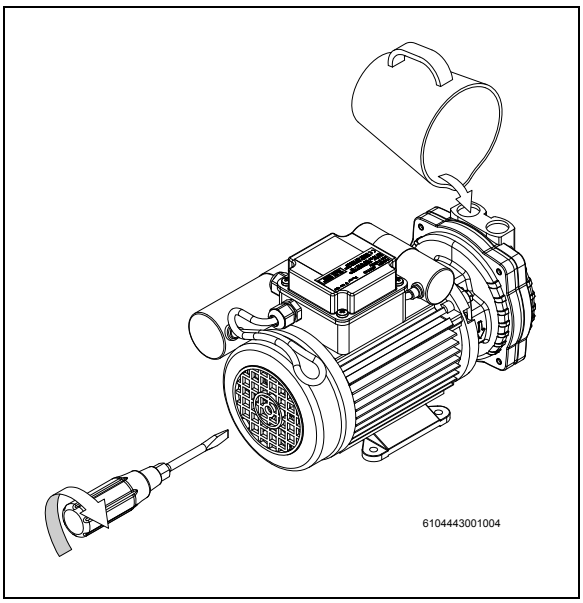

Fig. 10: Pour in preservative and turn shaft

9.3 Storage conditions

This chapter applies in the following cases:

- new pump-motor units,
- pump-motor unit that are already installed in a system and were prepared for a longer standstill, as described in Chapter 9.2, "Preparing for longer standstill", Pg. 22.

To prevent standstill damage during storage, the environment must provide the following conditions:

- dry,
- dust-free,
- low-vibration (effective value of vibration speed $v_{eff} \leq 0.2$ mm/s [0.008"/sec]).

Take the following measures for **commissioning following a longer standstill**:

- Measure the insulation resistance of the motor.
  In case of values ≤ 1kΩ per volt of nominal voltage, dry winding.
- Drain off preservative, as described in Chapter 9.1, "Draining", Pg. 22.
  Subsequent cleaning of the pump-motor unit is not required.
  Dispose of preservative in accordance with the manufacturer's specifications.
- For new pump-motor units:
  Install pump-motor unit as described in Chapter 6, "Installation", Pg. 11.
  Commission the pump-motor unit as described in Chapter 7, "Commissioning", Pg. 16.

  For pump-motor unit that are already installed in a system:
  Commission the pump-motor unit as described in Chapter 7, "Commissioning", Pg. 16.

⚠ DANGER

Electrical danger!
Work on electrical installations may be carried out by trained and authorized electricians only!

10 Servicing

⚠ WARNING

Improper use of the machine can result in serious or even fatal injuries!

Have you read the safety precautions in Chapter 1, "Safety", Pg. 3 f.?
Otherwise you may not carry out any work with or on the machine!

⚠ WARNING

Improper use of the unit can result in serious or even fatal injuries!

All maintenance work on the pump-motor unit must always be performed by the Service Department!

Inquire with the Service Department!

⚠ DANGER

Electrical danger!

Before beginning work on the unit or system, the following measures must be carried out:

- Deenergize.
- Secure against being switched on again.
- Determine whether deenergized.
- Ground and short-circuit.
- Cover or block off adjacent energized parts.

⚠ DANGER

Electrical danger!

Replace loose connections, singed or burned cables immediately!

⚠ DANGER

Electrical danger!

Depending on the charging state of the capacitors, a residual voltage may be present on the terminals in the terminal box.

After opening the terminal box cover, it must be ensured that the capacitors are completely deenergized:

- Measure the voltage at the corresponding jumpers (see the circuit diagram in the terminal box).
- Dissipate the residual voltage with suitable means if necessary.

The capacitors must be completely deenergized.

⚠ WARNING

Danger due to gauge pressure and vacuum!
Danger due to escaping fluid!

Before beginning work on the unit or system:

- Interrupt supply of operating liquid.
- Bleed lines and vacuum pump/compressor (depressurize).

⚠ WARNING

Danger from rotating external fan of unit!

It is prohibited to remove the fan guard!

⚠ WARNING

Danger from rotating impeller of unit!

It is prohibited to remove the vacuum pump/compressor cover and the housing!

⚠ WARNING

Danger of burns and scalding from hot surfaces of the pump-motor unit and from hot fluids!

Do not touch during operation!
Allow to cool after shut-down!

10.1 Maintenance

The pump-motor unit is largely maintenance-free.
If water containing lime is used as the operating liquid, the operating liquid must be softened or the pump-motor unit must be decalcified at regular intervals.
Refer to the following table:

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Contamination/Problem	Remedy
Dirt collects in the motor cooling fins.	Clean the motor cooling fins at regular intervals.
Fine-grain dirt (e.g. sand) get into the vacuum pump/compressor with the operating liquid or pumped gases/vapors.	Install a liquid separator, filter or screen in the feed pipe. It is prohibited to remov ethe vacuum pump/compressor housing!
Impeller is jammed.	Free shaft by turning. To do so, proceed as follows: • Shut unit down. • Guide a screwdriver through the central opening in the fan guard up to the shaft end on the external fan side (see Fig. 10, Pg. 23). • Turn the shaft by hand using the screwdriver. • Remove the screwdriver again.
Extremely hard water used as operating liquid Lime content > 15°dH).	Soften operating liquid. OR Decalcify the pump-motor unit at intervals of 3 months. To do this, proceed as follows (also see Fig. 11, Pg. 26): • Wear personal protective equipment (protective gloves and safety goggles), • Shut unit down. • Drain pump-motor unit as described in Chapter 9.1, "Draining", Pg. 22. • Remove pipes/hoses. • Fill the unit with decalcifying liquid through one of the connection openings. Use **10% solution of acetic acid** or another **commercially available decalcifying agent**. • Allow the decalcifying liquid to soak for at least 30 minutes. • Turn the shaft occasionally during this time. To do this, guide a screwdriver through the central opening in the fan guard up to the shaft end on the external fan side (see Fig. 11, Pg. 26). • Turn the shaft using the screwdriver. • Remove the screwdriver again. • Drain the decalcifying liquid out of the unit. To do this, proceed as described in Chapter 9.1, "Draining", Pg. 22. • Mount pipes/hoses. • When commissioning the pump-motor unit, proceed as described in Chapter 7, "Commissioning", Pg. 16. • The decalcifier can be disposed of in the sewer system.
Dirt gets into the air passages (fan guard, external fan, cooling fins) of the motor.	Clean the motor air passages regularly. To do so, proceed as follows: • Carry out protective measures for the use of compressed air: Wear personal protective equipment (protective gloves and safety goggles), secure surroundings. Remove objects lying around. • Blow in compressed air through the fan guard grate. • It is prohibited to remove the fan guard!

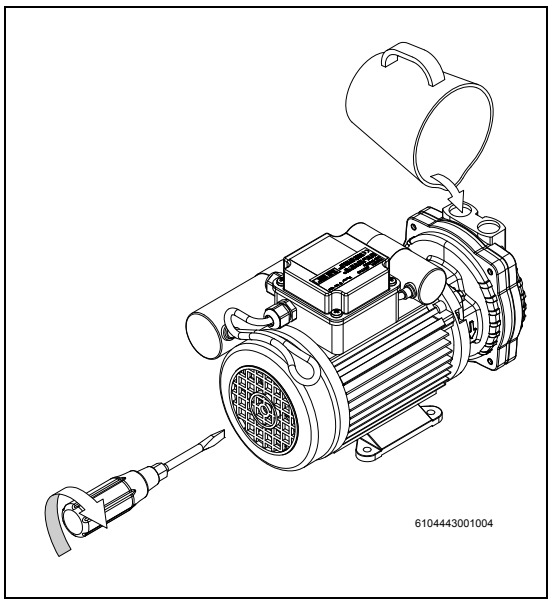

Fig. 11: Pouring in decalcifying agent and freeing shaft by turning

10.2 Repairs/troubleshooting

Fault	Cause	Remedy	Carried out by
Motor does not start, no running noise.	Interruption of the power supply, with single-phase model in one cable, with two-phase model in at least two cables.	Check fuses, terminals and cables for open circuit. Eliminate open circuit.	Electrician
Motor does not start, humming noises.	One power supply lead interrupted.	Check fuses, terminals and cables for open circuit. Eliminate open circuit.	Electrician
	Impeller is jammed.	Free shaft by turning. See Chapter 10.1, "Maintenance", Pg. 24.	Operator
		Decalcify vacuum pump/compressor. See Chapter 10.1, "Maintenance", Pg. 24.	Operator
		Drain and clean vacuum pump/compressor if necessary. See Chapter 10.1, "Maintenance", Pg. 24.	Operator
		Check and correct impeller gap setting if necessary.	Service
	Impeller defective.	Replace impeller.	Service
	Motor bearings defective.	Replace motor bearings.	Service

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Fault	Cause	Remedy	Carried out by
Protective motor switch trips when motor is switched on.	Winding short-circuit.	Have winding checked.	Electrician
	Motor overloaded.	Check operating-liquid flow rate and reduce if necessary. See Chapter 7.2, "Self-priming operation", Pg. 17 or 7.3, "Operation with operating-liquid feed", Pg. 18.	Operator
	Counter-pressure at discharge connection too high.	Reduce counter-pressure.	Operator
	Share of liquid also fed too high.	Reduce share of liquid also fed.	Operator
	Impeller is jammed.	See "Motor does not start, humming noises."	Operator/Service
Power consumption too high.	Lime or other deposits.	Decalcify vacuum pump/compressor. See Chapter 10.1, "Maintenance", Pg. 24.	Operator
		Clean vacuum pump/compressor. See Chapter 10.1, "Maintenance", Pg. 24.	Operator
Unit does not generate vacuum.	No operating liquid present.	Ensure proper operating-liquid flow rate. See Chapter 7.2, "Self-priming operation", Pg. 17 or Chapter 7.3, "Operation with operating-liquid feed", Pg. 18.	Operator
	Severe leak in the system.	Seal leak in the system.	Operator
	Wrong direction of rotation.	Reverse direction of rotation by interchanging two connecting leads.	Electrician
Unit generates insufficient vacuum.	Unit too small.	Use larger unit.	Operator
	Operating-liquid flow too low.	Increase operating-liquid flow rate to up to 2x the nominal flow rate. See Chapter 7.2, "Self-priming operation", Pg. 17 or Chapter 7.3, "Operation with operating-liquid feed", Pg. 18.	Operator
	Operating liquid too warm (nominal temperature: 15°C [59 °F]).	Cool or increase operating-liquid flow, See Chapter 7.2, "Self-priming operation", Pg. 17 or 7.3, "Operation with operating-liquid feed", Pg. 18.	Operator
	Erosion.	Inspect impeller. Replace impeller if necessary.	Service
		Replace affected components.	Service
	Leak in system.	Seal leak in the system.	Operator
	Mechanical seal leaky.	Replace mechanical seal.	Service
Screeching noises.	Cavitation of vacuum pump/compressor.	Connect cavitation-protection hose of liquid separator or clean cavitation-protection equipment.	Operator

Fault	Cause	Remedy	Carried out by
	Operating-liquid flow rate too high.	Check operating-liquid flow rate and reduce if necessary. See Chapter 7.3, "Operation with operating-liquid feed", Pg. 18.	Operator
	Pump-motor unit is started while flooded.	Check operating-liquid flow rate and reduce if necessary. After switching off pump-motor unit, no operating liquid may be fed in. See Chapter 7.3,“Operation with operating-liquid feed“, Pg. 18.	Operator
Unit leaky.	Seals defective.	Check seals.	Service

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10.3 Service/After-sales service

Our Service is available for work (in particular the installation of spare parts, as well as maintenance and repair work), not described in these operating instructions (see front page of these operating instructions).

Observe the following when **returning** pump-motor unit:

- Before shipping:
  - Drain the pump-motor unit so that it is residue-free,
    as described in Chapter 9.1, "Draining", Pg. 22.
  - Clean the unit on the outside,
    as described in Chapter 10.1, "Maintenance", Pg. 24.
- The pump-motor unit must be delivered complete, i.e. not dismantled.
- Only the original packing should be used for shipment.
- A declaration of clearance must be included with the shipment,
  as described in Chapter 10.4, "Decontamination and Declaration of Clearance", Pg. 29.
- The original rating plate of the pump-motor unit must be properly mounted, intact and legible.
  All warranty claims are voided for pump-motor units delivered for a damage expertise without the original rating plate or with a destroyed original rating plate.
- In case of warranty claims, the manufacturer must be informed of the operating conditions, operating duration etc. and additional detailed information provided on request if necessary.

10.4 Decontamination and Declaration of Clearance

⚠ WARNING

Danger from flammable, caustic or toxic substances!

To protect the environment and persons, the following applies:

Pump-motor unit which have come into contact with **dangerous substances** must always be decontaminated before being passed on to a workshop!

A so-called **Declaration of Clearance** must be included with each pump-motor unit that is given to a workshop for inspection, maintenance or repair.

The declaration of clearance

- is provided as a pre-printed form for photocopying on page 31,
- is legally binding,
- must be filled out and signed by authorized, qualified personnel,
- must be issued for each unit sent in (i.e. a separate declaration for each unit),
- must be attached outside on the packing of the unit,
- should be sent to as a copy by fax the workshop conducting the work prior to shipment.

This ensures

- that the unit has not come into contact with dangerous substances,
- that a unit that has come into contact with dangerous substances has been sufficiently decontaminated,
- that the inspection, maintenance or repair personnel can take the required protective measures if necessary.

NOTICE

The inspection/maintenance/ repair of the unit at the workshop will not be begun
until the declaration of clearance has been received!

If the declaration of clearance is not included with the shipment,
delays may result!

11 Disposal

Have the entire pump-motor unit scrapped by a suitable disposal company. No special measures are required when doing so.

For additional information on disposing of the unit, ask the Service Department.

EU declaration of conformity

Manufacturer: Gardner Denver Deutschland GmbH
P.O. Box 1510
D-97605 Bad Neustadt / Saale

Responsible for documentation: Holger Krause
P.O. Box 1510
D-97605 Bad Neustadt / Saale

Designation: Liquid ring vacuum pumps/ compressors
L-BV3
Types 2BV3151

The liquid ring vacuum pump/compressor described above meets the following applicable Community harmonisation legislation:

2006/42/EC Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC

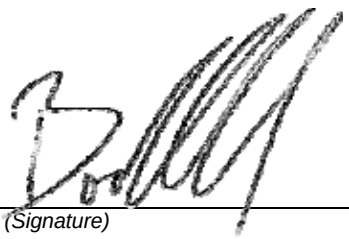
The protection targets of the directive 2006/95/EC have been met

Harmonised standards applied:

EN 1012-1:1996 Compressors and vacuum pumps — Safety requirements — Part 1: Compressors

EN 1012-2:1996 Compressors and vacuum pumps — Safety requirements — Part 2: Vacuum pumps

Bad Neustadt/Saale, 2009-12-29
(Place and date of issue)
ppa. Fred Bornschlegl
(Name and function)



(Signature)

664.44430.40.000

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Statement on health safety and on the protection of the environment

- For the safety of our employees and to comply with statutory requirements on handling substances harmful to the health and the environment, this statement must be enclosed, fully completed, with **each** unit/system sent.
- **Without the fully completed statement, repair/disposal is not possible and delays are unavoidable!**
- The statement is to be completed and signed by suitably qualified, authorised personnel at the operating organisation.
- In the case of shipment to Germany, the statement is to be completed in German or English.
- The statement is to be attached to the outside of the packing on shipment.
- If necessary, the carrier is to be informed.

1. **Product designation (type):** .....
2. **Serial number (no. BN):** .....
3. **Reason for sending:** .....
4. **The unit/system**
   - ☐ has **not** come into contact with hazardous substances. There will be **no** hazards for personnel or the environment during repair/disposal. Continue with "6. Legally binding statement“
   - ☐ has come into contact with hazardous substances. Continue with "5. Information on the contamination“
5. **Information on the contamination** (if necessary provide more information on an additional sheet)

   The unit/system was used in the following application:

   .....

   and has come into contact with the following classifiable substances or substances presenting a hazard to health/environment:

Trade name:	Chemical designation:	Hazardous substance class:	Properties (e.g. toxic, inflammable, caustic, radioactive):

   - ☐ The unit/system has been emptied in accordance with the operating instructions, flushed and cleaned externally.
   - ☐ Safety data sheets in accordance with the applicable regulations are enclosed (..... sheet).
   - ☐ The following safety precautions are necessary for handling (e.g. personal protective equipment):

     .....

     .....

6. **Legally binding statement**

   I herewith guarantee that the details specified are true and complete and that I, as signatory, am in a position to judge that this is so.
   We are aware that we are liable to the contractor for any damages arising from incomplete or incorrect specifications. We are obliged to indemnify the contractor against claims for damages by third parties arising from incomplete or incorrect specifications. We are aware that, irrespective of this statement, we are directly liable to third parties - in particular including the contractor's employees tasked with repair/disposal.

Company/institute:	.....		
Name, position:	.....	Phone:	.....
Street:	.....	Fax:	.....
Post code, city:	.....		
Country:	.....	Stamp:	
Date, signature:	.....		

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10.2009
English

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A Gardner Denver Product

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Gardner Denver

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